A SURVEY OF THE AQUATIC COLEOPTERA OF

CATFIELD FEN

Geoff Nobes. 2014

CONTENTS

1. Introduction

1.1 Catfield Fen is a Butterfly Conservation nature reserve in the Ant Valley of the Norfolk Broads. It lies within the Ant Broads and Marshes Site of Special Scientific Interest (SSSI), part of the Broads Special Area of Conservation (SAC). The Broads SAC is one of the UK and Europe's most important wetland areas, supporting over a quarter of the UK's rarest species. Catfield Fen and Sutton Fen are probably the best examples of this type of habitat.

1.2 Catfield Fen has been owned by Butterfly Conservation since September 1992. It was managed by the Norfolk branch of Butterfly Conservation until recently when the RSPB took over the management of the site.

1.3 The site has the following communities:

- Calcareous fen with saw sedge (a European Union priority habitat),
- *Molinia* meadow on calcareous, peaty or clayey-silt laden soils, and;
- 'Transition Mire and Quaking Bogs'.

1.4 These communities have evolved with a supply of base-rich groundwater and their presence supports many rare invertebrates including moths, beetles flies, molluscs and spiders.

1.5 The Broads Biodiversity Audit quantified fens as the most species-rich habitat in the Broads, supporting over 250 priority species of conservation concern. Catfield fen is particularly well-known as Internationally important for its aquatic coleoptera population and communities.

1.6 The author carried out a survey of the aquatic coleoptera on the Butterfly Conservation owned side of Catfield Fen in 2003 and 2004 (Nobes, 2003 & 2004).

1.7 Eighty-four species of water beetles were recorded in these two surveys, of which 18 had Red Data Book status and 18 had Nationally Notable status.

1.8 Water beetles are known to be particularly susceptible to changes in their environment, especially water chemistry and drying out of their habitat.

1.9 The author was approached by The RSPB to repeat the most recent 2004 survey of the water beetles at Catfield Fen, in September 2014. Exactly the same sites were surveyed as in 2004 and the same methods used. The results are contained in this report

2. METHODS

2.1. Eight sites were surveyed at Catfield Fen on 17/18 September 2014. (see plates 1, 2 &3).

2.2. Each pool was surveyed using a D-framed hand water net and flour sieve both with 1mm mesh. The net was used to take broad sweeps through open water and submerged vegetation. The sieve was used to skim the surface of shallow water for beetles near the edges of the pools after disturbance of the submerged vegetation, especially in grassy and mossy areas. No set time was spent at each site and collecting continued until no new species were being found. The contents of the nets were then emptied onto a large white tray and any water beetles and examined. Those species that could be easily identified in the field were noted and returned to the water, but some were retained that needed microscopic examination to determine the species. A few rare species were later retained as voucher specimens and preserved in propanol.

2.3. The following parameters were measured from each site in the survey:

a) pH and Conductivity.

b) The weather conditions during the survey and overnight

c) Eight-figure GPS readings were taken at each site to enable subsequent surveys to pin–point the exact sites surveyed.

d) Each site was photographed with a digital camera (see Plates 1, 2 &3).

e) A list of aquatic coleoptera was made from each site surveyed and national status of each noted (See Appendix 1 & 2). A note was also made of the dominant plant species in each pond.

f) Accounts are included of the characteristics of each site surveyed.

g) Accounts are included of the Red Data Book species of water beetles recorded.

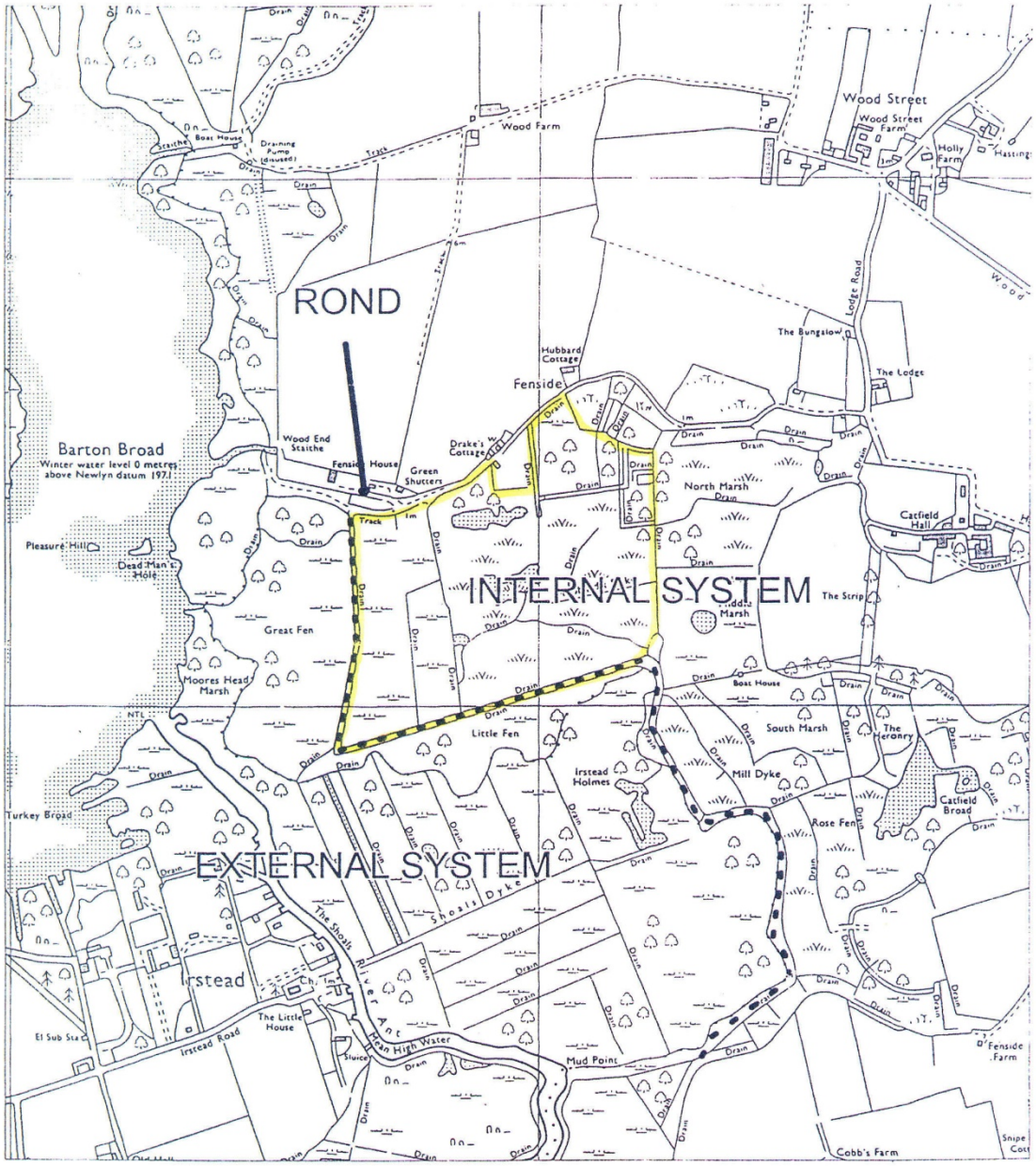
h) Analysis and comparison of the two surveys are included.

i) Photographs of all The Red Data Book species found in the survey are included.

2.4. The site visits were undertaken in warm and sunny weather conditions and there were no limiting factors.

MAP 1

ANT BROADS AND MARSHES SSSI
HYDROLOGY OF CATFIELD MARSHES



Shows extent of Catfield Fen owned by Butterfly Conservation

Map 2

BUTTERFLY CONSERVATION, NORFOLK BRANCH

CATFIELD FEN RESERVE

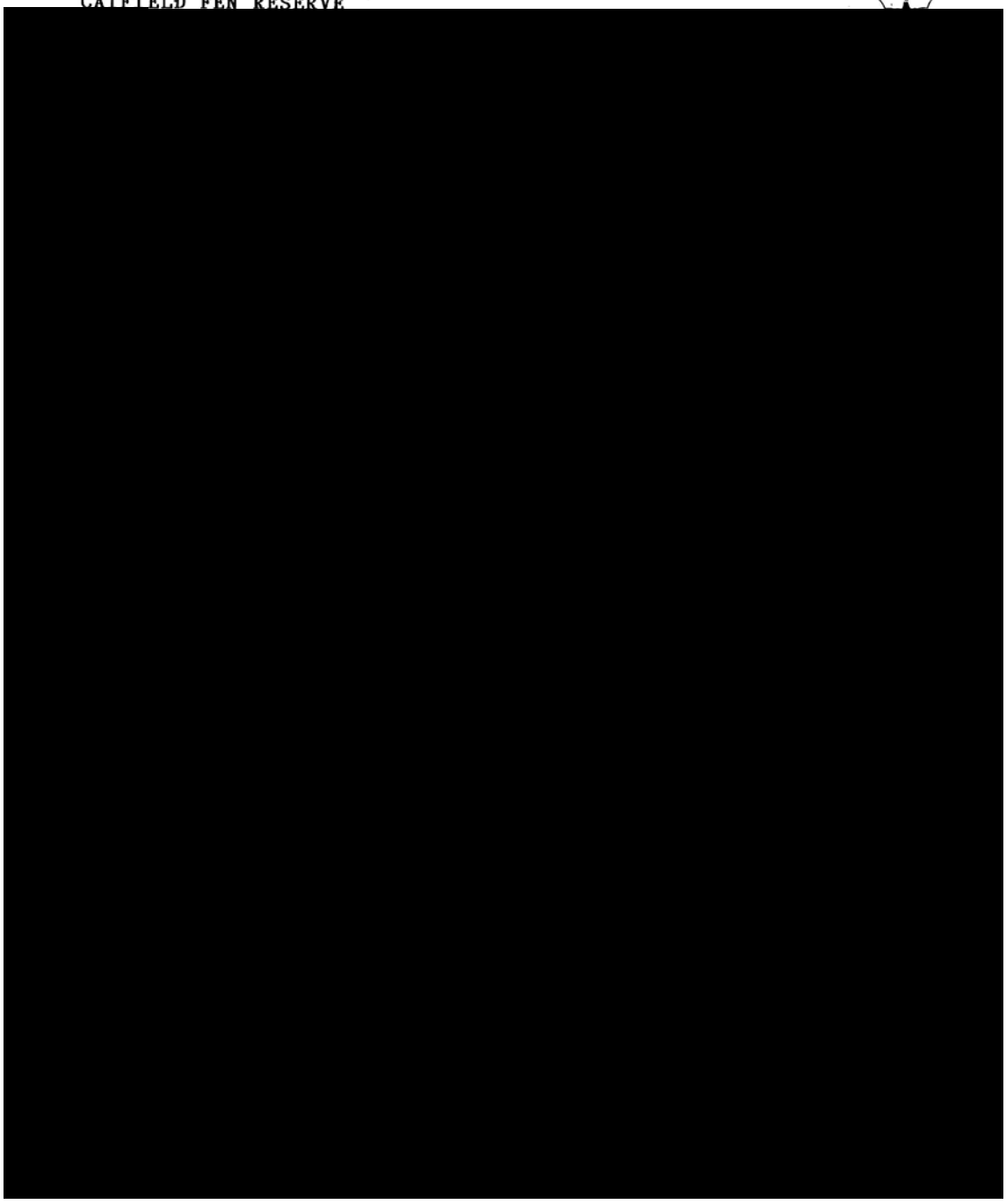
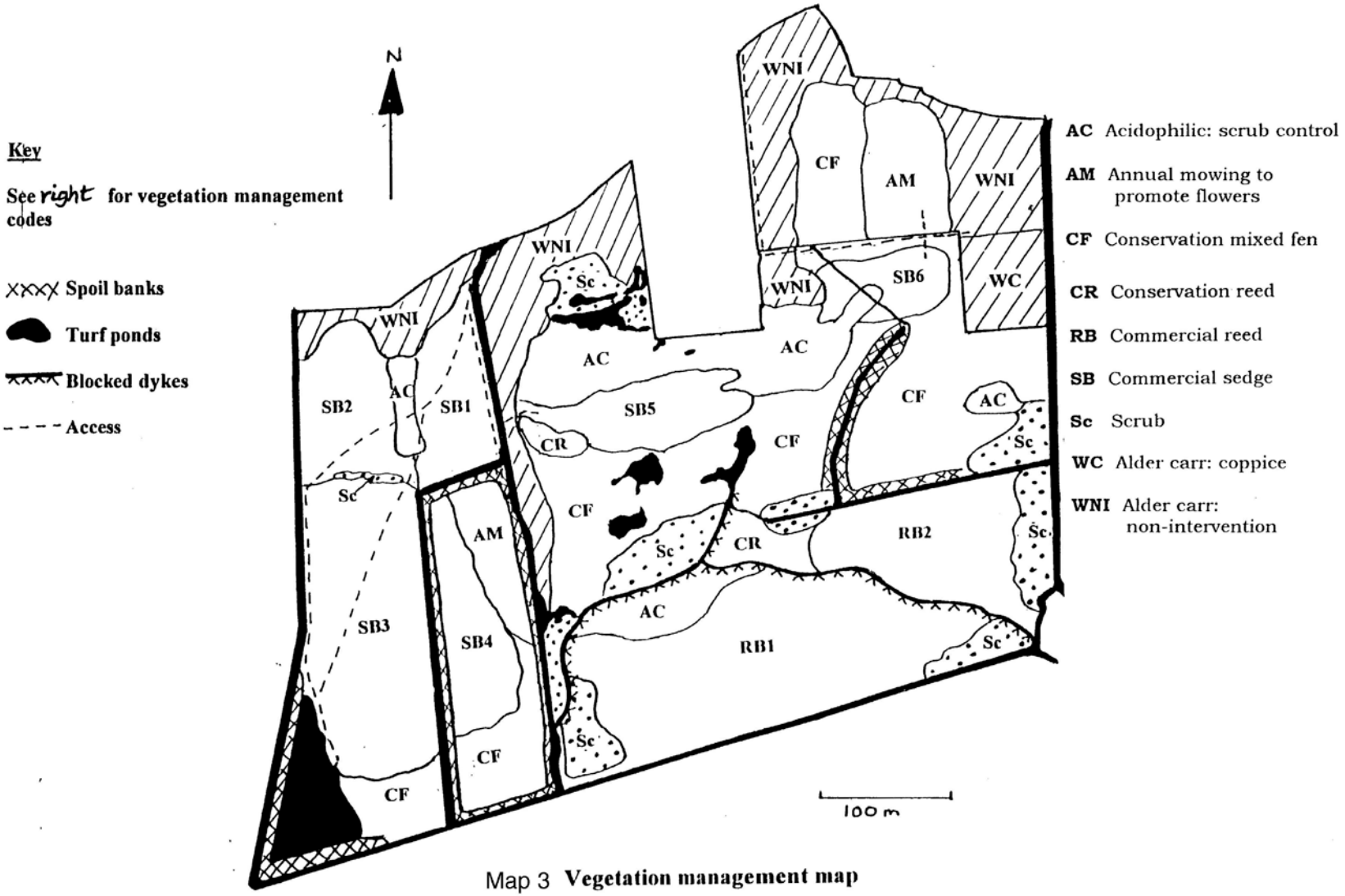


FIGURE 2. MANAGEMENT COMPARTMENTS

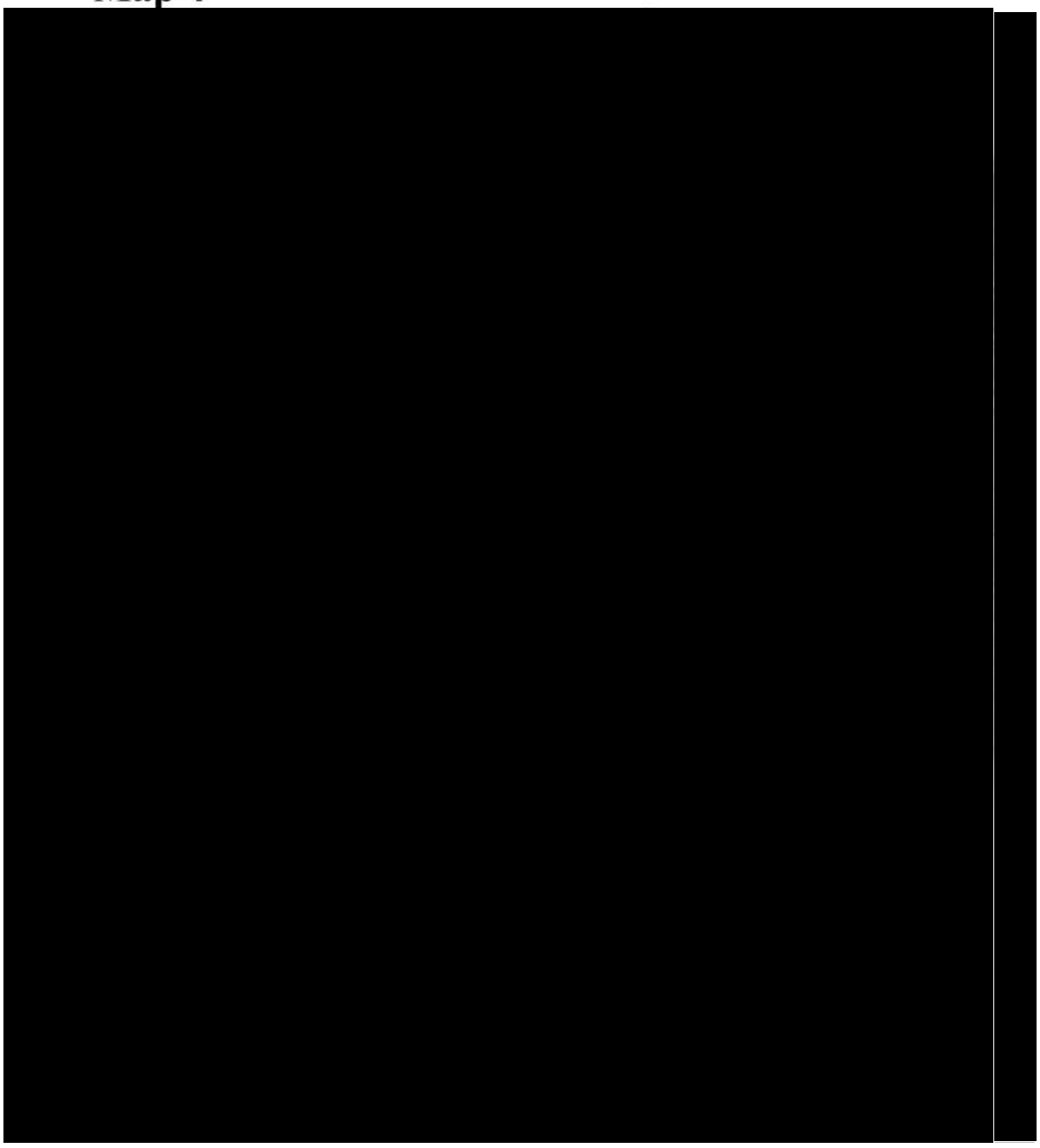
Map 3



Map 3 **Vegetation management map**

MAP SHOWING SAMPLING POINTS.

Map 4



3. NOTES ON THE SITES SURVEYED

3.1 No 1. Dyke, [redacted] TG366211. Surveyed 17th September 2014

3.1.1 This is a deep, steep sided, well vegetated dyke to the left of the main path at the edge of the fen (The Rond). This is a *Phragmites*-lined dyke about 5m wide and a metre deep with floating *Hydrocharis morsus-ranae* and *Stratiotes aloides*. Emergent vegetation included *Sium latifolium, Berula erecta, Peucedanum officinale* and *Cicuta virosa*. This is a difficult site to work with the net because of the steepness of the banks. Fifteen species of water beetles were found here including four Red Data Book species; *Dryops anglicanus, Gyrinus suffriani, Hydraena palustris* and *Limnebius aluta. Most of these* were obtained by working the few shallow margins amongst mud and reed litter. The local pond skater *Gerris argentatus* was abundant on the surface of the water here as was the common whirligig beetle *Gyrinus marinus*. This is a nice looking dyke with, clear, clean water and looks much as it did in 2004. The edge of the water is much easier of access now on the Butterfly Conservation side because a lot of the vegetation has been cleared close to the dyke and a perimeter path created. Only four common species of water beetles were found here in the 2004 survey. The pH of this dyke was measured at 6.7 and the conductivity at 450µS/cm.

3.2 No 2. The [redacted] TG367210. Surveyed 17th September 2014

3.2.1 This site has changed dramatically from when I last surveyed it in 2004 when it was a recently created shallow, reed-lined scrape with muddy silt. Back in 2004 the pond was open, shallow and clear of vegetation apart from reed around the edges and it was possible to walk easily across it. Now it is completely choked with *Phragmites* and *Cladium mariscus*. Amongst the reeds were a few small *Myrica gale* shrubs and there was some *Utricularia vulgaris* in the water but little else. The water was deeper than I remembered and only the margins could be surveyed. Fourteen species of water beetles were found here including fiveRed Data Book species; *Dryops anglicanus,Gyrinus, suffriani, Helochares obscurus, Hydrochus brevis* and *Limnebius aluta.* All these species were found by working amongst reed litter and shallow pools at the edges of the pond. More species of water beetles were found than in 2004 when only five species were recorded. The BAP species lesser water-measurer *Hydrometra gracilenta* was common in the reeds at the edges of the pond in 2004 but was not recorded during this survey. The pH of this pond was measured at 6.7 and the conductivity at 289µS/cm.

3.3 No 3. Dyke, [redacted] TG368210. Surveyed 17th September 2014

3.3.1 This is a superb dyke along the northern boundary of the site. The edges had been recently cleared of some overhanging trees and dyke side vegetation. Emergent vegetation included *Phragmites, Cladium mariscus, Carex elata, Dryopteris cristata, Sium latifolium* and *Berula erecta. Hydrocharis morsus-ranae* was common on the surface of the water. A feature of this dyke were the many small coves made into the banks by recent tree and vegetation removal. This had created shallow, silty, reed-litter margins ideal conditions for some of the rarer water beetle species. In this shallow water habitat were found the Red Data Book species; *Dryops anglicanus* and *Limnebius aluta*.The Red Data Book whirligig beetle *Gyrinus suffriani* was abundant here. Most of this dyke is like nearly all of the others on the reserve, deep and steep-sided. In this habitat some of the rarer, large water beetle species were frequent. These were *Graphoderus cinereus, Hydaticus transversalis* (particularly abundant) and *Hydaticus seminiger*. Twenty-five species of water beetles were found in this dyke. This site looked little different from when it was surveyed in 2004 when twenty species were found. Three rare species found at this site in 2004 but not recorded in the present survey were; *Hydrochus ignicollis*, *Hydrochus megaphallus a*nd *Helochares obscurus.* The pH at this site was measured at 6.6 and the conductivity at 409µS/cm. I note that I measured the pH of this dyke in 2004 as 7.2!

3.4 No 4. Sphagnum bog and dyke, [redacted] TG367212. Surveyed 17th September 2014

3.4.1 The shallow areas of *Sphagnum* were surveyed and also the adjacent dyke as in 2004. This dyke is lined with *Phragmites* and *Typha* and the edges have been recently cleared in places. *Hydrocharis morsus*-ranae was present as was *Utricularia vulgaris*. This was a superb site in 2004 when seven Red Data Book species of water beetles were found as well as the BAP species lesser water-measurer *Hydrometra gracilenta*. Twenty-seven species of water beetle were found here in 2004 but only eighteen in the present survey. Only two Red Data book species of water beetles were found in the 2014 survey, these were; *Dryops anglicanus* and *Limnebius aluta*. The dyke fauna here seems to have declined somewhat but the biggest change is the almost total absence of shallow pools of water in the large area of sphagnum adjacent to the dyke. This is the area where most of the rare water beetles were found in the 2004 survey. This area is now very much drier and is being taken over by woody plants and tree saplings. The pH in the dyke at this site was measured at 6.1 and the conductivity at 460µS/cm.

3.5 No 5. Sphagnum, [redacted] TG369211. Surveyed 18th September 2014

3.5.1 Along with nearby [redacted] this was the best site on the reserve for water beetles during the 2004 survey when nine Red Data Book species were recorded. This is a floating sphagnum bog area with tussocks of sedge and reeds and small clumps of willow scrub. The small pools created around these tussocks contained no less than 42 species of water beetles in 2004. This was a superb unspoilt area in 2004 and seemed to provide perfect conditions for rare water beetles to flourish. This was probably because it has not been disturbed by mowing and an irregular height of terrain has been maintained with frequent tussocks and willow scrub roots amongst the mossy pools.

3.5.2 This area has now declined dramatically for water beetles and only fifteen species were found in the 2014 survey. Four Red Data Book species were found, these were; *Hydroporus scalesianus, Helochares obscurus, Hydrochus megaphallus* and *Limnebius* aluta. Suitable habitat for water beetles was very hard to find as the area now is a lot drier with very few of the clear, deep, mossy pools that were alive with rare water beetle in 2004. What pools now remaining are very shallow with muddy silt. Beetles were very hard to find with very few specimens of each. The tussocks of *Sphagnum* remain but hold little or no water at their bases and they rise high and dry above the terrain of low sallow scrub and *Phragmites*. In 2004 this area held three of the rarest water beetles in Britain e.g. *Agabus striolatus, Hydroporus glabriusculus* and *Hydraena palustris*. None of these were recorded in the 2014 survey! Another feature very noticeable now is the abundance of alder seedlings and sapling taking over the marsh at the southern end of the site. The pH at this site was measured at 6.3 and the conductivity at 369µS/cm.

3.6 No 6. Dyke at Bridge. TG370212. Surveyed 18th September 2014

3.6.1 This is the dyke between [redacted] and [redacted] where there is as small bridge. This was probably the best dyke on the reserve for water beetles in 2004 when forty-two species were recorded including ten that had Red Data Book status. The RSPB have recently carried out a lot of management work in this area that was once remote and hard of access. They have created paths and cleared the edges of dykes and removing some of the water plants from the water. The dykes are deep like all the others on the reserve and lined with *Phragmites* and *Carex* tussocks. Other plants include; *Hydrocharis morsus-ranae*, *Stratiotes aloides, Berula erecta* and *Carex elata.*

3.6.2 Sixteen species of water beetles were found here this year including the Red Data Book species; *Graphoderus cinereus, Hydaticus seminiger, Hydrochus brevis* and *Limnebius aluta*. The lack of species found this year can probably be put down to the recent clearance of most of the pond weed from the dyke, although it was nice to see that *Graphoderus cinereus* is still present (three specimens were caught). This is a large, beautifully marked water beetle and Catfield is its only known Norfolk site. A noticeable absentee from this year's survey was the large, Red Data Book *Dytiscid, Dytiscus dimidiatus* that was found in this dyke in 2004. It is expected that this dyke will improve in a couple of years once the water weed begins to grow again, giving the beetles some refuge. A very noticeable feature of this site was the lack of wet margins and pools that were present in the 2004 survey at the edges of the dyke. This probably accounts for the absence of the three rare *Hydrochus* species that were recorded in 2004.

3.6.3 The fen area close to the dyke was looking very dry at the time of the survey, much drier than in 2004.

3.6.4 The pH in the dyke at this site was measured at 6.5 and the conductivity at 458µS/cm.

3.7 No 7. Fen, Hubbards Marsh. TG371212. Surveyed 18th September 2014

3.7.1 I wrote in 2004 that "This is probably the most important area on the reserve along with [redacted] for water beetles". Nine Red Data Book species of water beetle were recorded in the survey here that year. This year, although more species were recorded (twenty-two) only four of the rare species were found, these were; *Hydroporus scalesianus, Helochares obscurus* and *Limnebius aluta*.

3.7.2 This is a particularly wild area and the terrain makes it difficult to access. It consists of *Phragmites* and sedge amongst sallow and bog myrtle thickets. This area also was looking very much drier than it did in 2004, when the small pools amongst the tussocks were alive with rare water beetles. It was very difficult to find any water here to survey this year most of the small pools were now dry and the very few that had any water in were very shallow and silted. The increase in woody plants and scrub was very noticeable here.

3.7.3 The pH at this site was measured at 6.4 and the conductivity at 430Ms/cm.

3.8 No 8. Dyke, [redacted] TG371213. Surveyed 18th September 2014

3.8.1 This is basically a continuation of the dyke eastwards from the bridge. Thirty-four species of water beetle were recorded here in 2004 including eight that had Red Data Book status. This years survey only found fifteen species, five of which had Red Data Book status; *Graphoderus cinereus, Helochares obscurus, Hydaticus transversalis*, *Hydrochus ignicollis* and *Dryops anglicanus.* The BAP species lesser water-measurer *Hydrometra gracilenta* was found at the edge of the reedbed here. This is a well-vegetated dyke with floating *Hydrocharis morsus-ranae* and *Stratiotes aloides.* Emergent vegetation included *Berula erecta.*

3.8.2 This dyke is little changed from the 2004 survey and still holds a high percentage of rare water beetle species.

3.8.3 The pH of the dyke at this site was measured at 6.5 and the conductivity at 458µS/cm.

4. NOTES ON THE RED DATA BOOK SPECIES OF AQUATIC COLEOPTERA FOUND IN THE 2014 SURVEY.

4.1 GYRINUS SUFFRIANI. VULNERABLE

A whirligig beetle **Family GYRINIDAE**

4.1.1 Distribution: This species is sporadic or rare throughout its range. The only other site in Norfolk where it occurs is in the pingo system of Thompson Common in west Norfolk.

4.1.2 Habitat and ecology: *G. suffriani* is one of smallest British whirligig beetles being a little over 4mm in length.

Unusual for this genus, this species spends most of the time submerged but when it does gyrate on the surface it moves exceptionally fast. It is most typically found at the edges of reedbeds but also occurs at Catfield in shallow, well vegetated runnels and in the dykes.

4.1.3 Status: *Gyrinus suffiani* has been recorded from only twelve hectads in England and Wales from 1980 onwards. It occurs at several sites in the Norfolk Broads, Catfield Fen being its stronghold. There is also one record of a female from Thompson Common in west Norfolk. It is extinct in Scotland. This species still occurs in good numbers at Catfield Fen and was found at three sites during the 2014 survey.

4.1.4 Threats: This species is at risk from habitat loss, particularly through drainage and water abstraction, and also through loss of water quality, including any pollution likely to result in reduced amounts of dissolved oxygen.

4.2 HYDROPORUS SCALESIANUS. VULNERABLE

A diving beetle **Family DYTISCIDAE**

4.2.1 Distribution: This species is principally associated with pool systems in former periglacial areas in England. It is also recorded from Thompson and East Walton Commons and several sites in the Norfolk Broads.

4.2.2 Habitat: This is a tiny, brown coloured beetle, being a mere 2.2 mm in length. This is another species preferring cool, tussocky, shallow, mossy pools. It was found at Catfield Fen in this habitat in shallow pools amongst low sallow scrub, in [redacted] and [redacted]

4.2.3 Status: *Hydroporus scalescianus* has been recorded from sixteen hectads in Britain from 1980, from relic habitats.

4.2.4 Threats: Drainage of fen sites would threaten this species but it seems to be able to tolerate summer drying out of its habitat as long as it refills in the winter.

4.3 GRAPHODERUS CINEREUS. VULNERABLE

A diving beetle **Family DYTISCIDAE**

4.3.1 Distribution: The distribution of this superb water beetle in Britain is highly restricted being found only in a few sites in southern England. Professor Garth Foster found this species at Catfield in

1988, but the location is thought to have been Great Fen. The author found this beetle this beetle on the Butterfly Conservation side in 2003. The sites were North water and The [redacted] In 2004 it was found in the dyke between Mill and [redacted] The 2014 survey found this beetle still to be present at the latter site and also in another dyke nearby.

4.3.2 Habitat and ecology: *Graphoderus cinereus* occurs in richly vegetated lowland ponds and ditches. Peaks of adult abundance in May and July in a Swiss population indicate breeding in early summer with emergence of new adults in the summer. The adults appear to overwinter at the breeding sites, either in water or moist moss.

4.3.3 Status: *G. cinereus* has been recorded from six hectads in England from 1980 and only three sites known since 2000. This shows clear evidence of decline.

4.3.4 Threats: Local extinction in the fens north of Cambridge indicates that the greatest threat is posed by drainage of old fen systems. Loss from the Pevensey Levels indicates sensitivity to poor water quality. However, this species is able to colonise new habitats (as may be the case with the [redacted] record at Catfield).

4.3.5 Footnote 1: Catfield Fen is the only recorded site in Britain for the now thought to be extinct *Graphoderus bilineatus*. The last record was in 1906 by Balfour-Browne, but the exact location is unknown. Other entomologists have searched in vain for it at Catfield, including the use of underwater traps. There is just the possibility that it still survives at Catfield, though it is said to be found in deeper ponds then are found there. It is very similar to *G. cinereus* but has a thinner dark pronotal line on the back margin.

4.3.6 Footnote 2: The last British record for the now thought to be extinct *Rhantus bistriatus* was from a 'ditch in Potter Heigham', (probable Catfield Fen) by Balfour- Browne in 1904. This species has also been searched for recently in the area, but without success. Again, there is still the chance that it remains undetected in the area. Nilsson & Holman (1995) describe the main habitat as temporary, grassy ponds in open land, which doesn't really describe Catfield! It is rated as extinct or endangered in many European Red Lists.

4.4 LIMNEBIUS ALUTA. Near Threatened

A crawling waterbeetle **Family Hydraenidae**

4.4.1 Distribution: This is the smallest British water beetle ranging between 1-1.3 mm in length. There are recent records from a few sites in southern England, the midlands and Yorkshire. It is a common species at Catfield Fen.

4.4.2 Habitat and ecology: *Limnebius aluta* is confined to relic lowland fen areas, living in the edges of pools and ditches with mud, wet moss and litter beneath rich, emergent vegetation. This species was widespread across the site during the survey having been found in seven of the eight sites.

4.4.3 Status: *L. aluta* is known from 21 hectads in England and Wales from 1980 onwards.

4.4.4 Threats: Loss of rich fenland habitats in relic areas must constitute the main threat.

4.5 HYDROCHUS BREVIS. Near Threatened

A crawling water beetle **Family Hydrochidae**

4.5.1 Distribution: This species no longer exists at many of its former sites in northern Britain, but is still common in many relic sites in the Norfolk Breckland and Broadland, including Catfield.

4.5.2 Habitat and ecology: *H. brevis* occurs in well established weedy pools and fens with thick emergent vegetation often in partial shade and usually with a soft bottom of mud or peat. *Hydrochus* species are aquatic as adults and larvae, but do not swim. They are slow in their movements and feign death when disturbed. Adults feed on algae.

4.5.3 Status: There are records for 25 hectads in Britain from 1980 onwards. The species no longer exists at many of its former sites in northern Britain, but still occurs in many relic sites in Breckland and Broadland.

4.5.4 Threats: Loss of relic fenland habitats across across Britain has resulted in localised extinctions in all but the Breckland and Broadland of Norfolk.

4.6 HYDROCHUS IGNICOLLIS. Near Threatened

A crawling water beetle **Family Hydrochidae**

4.6.1 Distribution: *Hydrochus ignicollis* is a northern European species, not reaching the Mediterranean; and being rather more widely distributed in north-west Europe than *H. elongatus.*
It is a rare species in Britain with most records from the southern counties of England, but ranging as far north as Anglesey. It has been found in west and east Norfolk with most records from the Broads area, where Catfield is its stronghold.

4.6.2 Habitat and ecology: This species occurs in stagnant, well vegetated pools often with moss in the margins of pools that dry out such as the Breckland pingos of east Norfolk. The habitat at Catfield fen was found to be somewhat different*, H. ignicollis* only being found amongst thick reed litter at the edge of deep drainage dykes. Unlike *H. elongatus* this species is exclusively associated with ancient fenland. *Hydrochus* larvae are aquatic as adults and larvae, but do not swim. They are slow in their movements and feign death when disturbed. Adults feed on algae according to Archangelsky (1998). But the larval diet is unknown. This species was found at the edges of three of the dykes during this survey.

4.6.3 Status: With records from just eighteen hectads in England and Wales from 1980 onwards this species might just qualify for the IUCN Vulnerable status on the basis of its area of occupancy. However, despite its primary association with relic fen, it cannot be claimed to be in decline and it is safer to regard it as Near Threatened

4.6.4. Threats and management and conservation Loss of fenland habitats and water abstraction has resulted in a contraction in the range of this species. Reed-fringed dykes seem to be the preferred habitat at Catfield and any excessive clearing of reed litter from the edge of dykes should be avoided, or at least, not all done at one time.

4.7 HYDROCHUS MEGAPHALLUS. VULNERABLE

A crawling water beetle **Family Hydrochidae**

4.7.1 Distribution: In 1988 it was discovered that we have another species occurring in Europe that is very similar to *H. brevis*. This is *H. megaphallus* and was detected by Arno Van Berge Henegouwen whilst he was preparing a paper on *Hydrochus* and a new species was given to him from Turkey. (Henegegouwen. 1988). It was subsequently found to be widespread in Europe, including England by examining museum collection specimens. The males of these two species are easily separated by examining the genital capsule which in *H. megaphallus*, is almost twice the size of *H. brevis*. (Hence the name)!

Museum material indicates that this species was possibly commoner than *H. brevis* in the Broads at the turn of the Century. Specimens from the British Museum (Natural History) survey of Lopham Fen, East Suffolk are *H. megaphallus*. The author re-found this species at Lopham Fen in 2004 (Nobes. 2004). This species has been recorded from only five hectads in the Broads area since 1990 and is clearly rarer than *H. brevis*, which can easily be justified as a vulnerable species. Thus, despite the recent discovery of this species, it is possible to justify its high conservation status.

4.7.2 Habitat and ecology: This species coexists with *H. brevis* at Catfield. *Hydrochus* species are aquatic as adults and larvae, but do not swim. They are slow in their movements and feign death when disturbed. Adults feed on algae according to Archangelsky (1998) but the larval diet is unknown.

This species was only found at only one site in a shallow pool amongst *Sphagnum* and sallow scrub during this survey, No 5 at [redacted] This was in sharp contrast from the 2004 survey when it was found in six of the eight sites surveyed. This shows a significant decline of this species at Catfield Fen, probably caused by drying out of the shallow pools that it requires for breeding.

4.7.3 Status: *H. megaphallus* has been recorded from five hectads in the Broads area from 1980 onwards. *H. megaphallus* appears to have become more restricted than *H. Brevis* in even the most natural fen, indicating the fragility of the precise conditions that it requires.

4.7.4 Threats: Loss of relic fen conditions, particularly fragmentation of larger fen systems, would appear to be detrimental. Extraction of ground water, as for example with the borehole at Lopham Fen, will cause the extinction of this species in Britain.

4.8 HELOCHARES OBSCURUS. VULNERABLE

A crawling water beetle **Family Hydrophilidae**

4.8.1 Distribution: Since 1980 there are records for Huntingdon, Herefordshire and East Norfolk. *H. obsurus* was recognised as distinct from the common *H. punctatus* in 1967 by (Kevin 1967).

4.8.2 Habitat and ecology: Usually found in stagnant water in rich and bogs fens. *H. obscurus* has two peaks of emergence as adults, indicating a single generation each year with larvae in the summer. The preferred habitat at Catfield appears to be the more acidic parts of the fen, often *a*mongst *Sphagnum*. This beetle was only found in one site during the 2004 survey but appears now to be more widespread, being present in five sites.

4.8.3 Status: *H. obscurus* has been recorded from eleven hectads in England since 1980. The distribution appears to be relic in East Anglian fenland. The Norfolk Broads are a stronghold for this species it being found at several sites. But this is an area at risk from marine incursion.

4.8.4 Threats: The occurrence of this species in disturbed habitats in relic fenland suggests that it would be at risk from overgrowth of ponds on unmanaged reserves.

4.9 HYDRAENA PALUSTRIS. Near Threatened

A crawling water beetle **Family Hydraenidae**

4.9.1 Distribution: This is a central European species, ranging to southern Fennoscandia and the northern Balkans. In Britain it has recently been found in some numbers in Hornsea Mere, east Yorkshire (Hammond 2002). There is also a record for the Lake District and the species is included in the Ramsar citation for the Lower Derwent Valley (Foster 2000). Otherwise, it is only found in East Anglia.

It occurs at Thompson Common in the Norfolk Breckland, but the stronghold for this species seems to be in the Catfield area, with records for Catfield Hall Estate as well as Catfield Great Fen. It has also been found at Upgate Common (Nobes 2001). This species was recorded by the author in the Butterfly Conservation side of Catfield Fen in 2004 at [redacted] and [redacted] The only record in the current survey was from Site No 1 the dyke at [redacted]

4.9.2 Habitat and ecology: *Hydraena palustris* prefers temporary and semi-permanent, stagnant water, and is confined to areas with well developed marginal vegetation, especially litter-generating–species such as reeds and sedges. It can occur in partial shade in fen carr. The Catfield specimens were found in very shallow water amongst swampy moss, reed litter and mud. They are very hard to locate because of their very small size and brown coloring. It appears to have one generation a year with a peak of adult breeding and abundance in the spring.

4.9.3 Status: *H. palustris* is known from fourteen hectads in England from 1980 onwards. There is no evidence of decline but the strong association with relic fenland indicates that this species is potentionally under threat.

4.9.4 Threats: Former losses of relic fenland stagnant water habitats have probably caused this species to become restricted mainly to East Anglia and eastern Yorkshire.

4.10 DRYOPS ANGLICANUS Near Threatened

A crawling water beetle **Family Dryopidae**

4.10.1 Distribution: Published records are confined to West Suffolk, East and West Norfolk, Cambridgeshire and Berwickshire. In Norfolk it is common at some of the pingo sites such as Thompson and Foulden Commons and at a few sites in Broadland.

4.10.2 Habitat and ecology: Adults appear throughout the year and larvae have been found in winter. This species is confined to wet vegetation at the edge of relic lowland fen and fen carr, often in association with tussocks. Its larvae feed under bark of wet, rotting tree debris. *D. anglicanus* was found in six sites at Catfield in both the 2004 and 2014 surveys.

4.10.3 Status: *D. anglicanus* has been recorded from fifteen hectads in England and Scotland from 1980 onwards with little contraction of range. The sites are exclusively relic and natural in origin.

4.10.4 Threats: Drainage and pollution of natural fenland sites must result in localised extinction. The possible association with rotting wood indicates a need to maintain fen carr habitats.The population of *D. anglicanus* at Redgrave and Lopham Fens are identified by (Bennet 1996) as being of high risk of damage from excessive abstraction of water for public water supply.

5. Results

- Seventy-one species of water beetles were recorded in the 2004 survey
- Fifty-six species of water beetles were recorded in the 2014 survey (78%)
- Fifteen Red Data Book species of water beetles were recorded in 2004 survey
- Ten Red Data Book species of water beetles were recorded in the 2014 survey (66%).
- Sixteen Nationally Scarce species of water beetles were recorded in 2004
- Five Nationally Scarce species of water beetles were recorded in 2014*(31%)
- Twenty-four species recorded in 2004 were not recorded in 2014
- Nine species not recorded in 2004 were recorded in 2014
- A decrease in the number of water beetles at five of the eight survey sites
- An increase in the number of water beetles at three of the sites
- Forty-seven of the species recorded in 2004 were also found in 2014

Note * Many of the species designated as nationally Notable N/b in 2004 have now had their designations reduced to widespread.

6. Analysis of the species recorded in the 2004 and 2014 surveys

Table 1: Species recorded during 2014 surveys and differences to 2004 survey results			
RDB sps	**Not recorded 2014**	**Same species as 2004**	**New species 2014**
	Haliplus ruficollis	*Haliplus ruficollis*	*Peltodytes caesus*
	Noterus clavicornis	*Noterus clavicornis*	*Hygrobia hermanni*
	Noterus crassicornis	*Noterus crassicornis*	*Colymbetes fuscus*
	Laccophilus minutus	*Laccophilus minutus*	*Rhantus suturalis*
	Hyphydrus ovatus	*Hyphydrus ovatus*	*Dytiscus semisulcatus*
	Hydroglyphus pusillus		*Laccobius colon*
	Hygrotus decoratus	*Hygrotus decoratus*	*Laccobius minutus*
	Hygrotus inaequalis	*Hygrotus inaequalis*	*Anacaena globulus*
	Hygrotus versicolor		*Ochthebius minimus*
	Hygrotus impressopunctatus		
	Hydroporus angustatus	*Hydroporus angustatus*	
	Suphrodytes dorsalis	*Suphrodytes dorsalis*	
	Hydroporus erythrocephalus	*Hydroporus erythrocephalus*	
RDB3	*Hydroporus glabriusculus*		
	Hydroporus gyllenhali	*Hydroporus gyllenhalii*	
	Hydroporus melanarius		
	Hydroporus neglectus	*Hydroporus neglectus*	
	Hydroporus palustris	*Hydroporus palustris*	
	Hydroporus pubescens		
RDB3	*Hydroporus scalesianus*	*Hydroporus scalesianus*	
	Hydroporus striola		
	Hydroporus tristis	*Hydroporus tristis*	
	Graptodytes granularis	*Graptodytes granularis*	
	Graptodytes pictus		
	Porhydrus lineatus		
RDB3	*Laccornis oblongus*		
	Liopterus haemorrhoidalis	*Liopterus haemorrhoidalis*	
	Agabus bipustulatus	*Agabus bipustulatus*	
RDB2	*Agabus striolatus*		
	Agabus sturmi	*Agabus sturmii*	
	Agabus unguicularis	*Agabus unguicularis*	
	Ilybius guttiger	*Ilybius guttiger*	
	Ilybius quadriguttatus	*Ilybius quadriguttatus*	
	Rhantus exsoletus		
	Rhantus grapii	*Rhantus grapii*	
	Hydaticus seminiger	*Hydaticus seminiger*	
	Hydaticus transversalis	*Hydaticus transversalis*	
RDB3	*Graphoderus cinereus*	*Graphoderus cinereus*	
RDB3	*Dytiscus dimidiatus*		

	Gyrinus paykulli		
	Gyrinus marinus	*Gyrinus marinus*	
RDB3	*Gyrinus suffriani*	*Gyrinus suffriani*	
	Hydrochus angustatus		
RDB3	*Hydrochus brevis*	*Hydrochus brevis*	
RDB3	*Hydrochus ignicollis*	*Hydrochus ignicollis*	
RDB3	*Hydrochus megaphallus*	*Hydrochus megaphallus*	
	Helophorus flavipes		
	Helophorus grandis		
	Helophorus minutus		
	Helophorus obscurus		
	Coelostoma orbiculare	*Coelostoma orbiculare*	
	Cercyon convexiusculus	*Cercyon convexiusculus*	
	Hydrobius fuscipes	*Hydrobius fuscipes*	
	Anacaena limbata	*Anacaena limbata*	
	Anacaena lutescens	*Anacaena lutescens*	
	Laccobius bipunctatus	*Laccobius bipunctatus*	
RDB3	*Helochares obscurus*	*Helochares obscurus*	
	Enochrus coarctatus	*Enochrus coarctatus*	
	Enochrus halophilus		
RDB3	*Enochrus nigritus*		
	Enochrus melanocephalus		
	Enochrus ochropterus	*Enochrus ochropterus*	
	Enochrus testaceus	*Enochrus testaceus*	
	Cymbiodyta marginellus	*Cymbiodyta marginellus*	
	Chaetarthria seminulum		
RDB3	*Hydraena palustris*	*Hydraena palustris*	
	Hydraena riparia	*Hydraena riparia*	
	Hydraena testacea	*Hydraena testacea*	
RDB3	*Limnebius aluta*	*Limnebius aluta*	
RDB3	*Dryops anglicanus*	*Dryops anglicanus*	
	Dryops luridus		
15 RDB	**24**	**10 RDB** **47**	**9**

Table 4: Number of sites for RDB species in 2004 and 2014 surveys

RDB species	No of sites recorded	
	2004	2014
Hydroporus glabriusculus	2	0
Hydroporus scalesianus	4	2
Laccornis oblongus	2	0
Agabus striolatus	1	0
Graphoderus cinereus	2	3
Dytiscus dimidiatus	2	0
Gyrinus suffriani	2	3
Hydrochus brevis	3	1
Hydrochus ignicollis	3	2

Hydrochus megaphallus	6	1
Helophorus obscurus	1	5
Enochrus nigritus	1	0
Hydaena palustris	2	1
Limnebius aluta	5	7
Dryops anglicanus	1	6
No of sites	**37**	**31**

Table 3: Number of species of water beetles recorded at each site 2004 and 2014

Site	Site No	2004	2005
Dyke. [redacted]	1	4	14
[redacted]	2	5	19
Dyke [redacted]	3	20	25
Sphagnum. [redacted]	4	27	18
Sphagnum. [redacted]	5	42	15
Dyke at bridge	6	42	17
Fen. [redacted]	7	30	22
Dyke. [redacted]	8	34	14
		204	**144**

7. Conclusions

7.1 The 2014 survey of the water beetles of Catfield Fen has shown a marked decline in the species and number of specimens recorded. There has been a reduction of 22% in the number of species recorded. Even more alarmingly, there has been a reduction of 34% in the number of Red Data Book species recorded. There has also been a huge reduction in the numbers of nationally notable species recorded (69%), although this can be partially accounted for by the fact that some have had their designations downgraded since 2004.

7.2 There has been a reduction of water beetle species at five of the eight sites surveyed.

7.3 An increase in the number of species at three of the sites was also noted (mainly dykes).

7.4 Good water beetle habitat was now very hard to find, the clear, mossy pools in fen vegetation with *Chara* and *Utricularia* present in 2004 were almost totally lacking. The few pools that did remain were now very shallow and filled with silty mud and contained very few beetles. The site is very noticeably drying out especially amongst sallow scrub where many of the *Sphagnum* tussocks where now 'high and dry' in both [redacted] and [redacted] Woody plants were now invading these areas with young alder saplings now abundant. The edges of the dykes were, in 2004 amongst the best areas for the rarer water beetle, but do not now contain the shallow, well vegetated pools they once did and were a lot drier. A great increase in the cover of grass species is also noted, this particular plant being almost absent from the site in 2004. This feature can probably be directly attributed to the drying out of the fen.

7.5 The area on [redacted] where the population of fen orchids are was very dry at the time of the survey and no pools at all where found that could be surveyed for water beetles. A great increase in the amount of *Sphagnum* was noted here compared with the 2004 survey.

7.6 It is clear from this survey that Catfield Fen has a greatly reduced aquatic coleoptera fauna from that present in 2004 and that the drying out of the site is largely to blame.

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8. REFERENCES:

Balfour-Browne, F., 1950. *British Water Beetles* 1. Ray Society, London.

Archangelsjy, M. 1998. Phylogeny of Hydrophilidae (Coleoptera: Staphyliniformia) using characters from adults and prelimaginal stages. *Systematic Entomology* 23: 9-24.

Bennett, S., 1996. *Impact of water abstractionon wetland SSSIs.* English Nature Freshwater Series No 4. Peterborough: English Nature.

Clarke, H., 1855. Synonymic list of the British carnivorous water beetles. *Zoologist* 13. 4846-4869.

Foster, G. N., 1982c. Notes on rare Dytiscidae (Coleoptera) in Norfolk. *Transactions of the Norfolk and Norwich Naturalist's Society*, 26: 3-10.

Foster, G. N., 2000. A review of the scarce and threatened Coleoptera of Great Britain.NCC. (In press)

Foster, G. N., 2010. A review of the scarce and threatened Coleoptera of Great Britain Part 3: Water beetles of Great Britain. *Species status* 1. Joint Nature Committee, Peterborough.

Friday, L.E. 1988. A Key to the Adults of British Water Beetles. AIDGAP.

Harris, J. 2003. A Management Plan for Catfield Fen Butterfly Conservation Reserve. 2003-2007.

Huxley, T. 2003. Provisional atlas of the British aquatic bugs, (Hemiptera, Heteroptera. BRC.

Kirby, P. 1992. A review of the scarce and threatened Hemiptera of Great Britain. JNCC.

Nau, B. S. 2003. Checklist of the Heteroptera of the British Isles. (*Draft)*

Nilsson & Holman. 1995. The aquatic (Coleoptera) of Fennoscandia and Denmark. 11. Dytiscidae.

Nobes, G. N. 2001. Two new sites for *Agabus striolatus* (Gyllenhal) in Norfolk. *Latissimus,* 13,15.

Nobes, G. N., 2003. A survey of the aquatic coleoptera & hemiptera heteroptera of Catfield Fen. Report to Butterfly Conservation, Norfolk Branch.

Nobes, G. N., 2004. A survey of the aquatic coleoptera & hemiptera heteroptera of Catfield Fen. Report to Butterfly Conservation, Norfolk Branch.

Appendices

Appendix 1:

SPECIES LIST OF AQUATIC COLEOPTERA RECORDED IN 2014 SURVEY

Grid ref: TG	36621 1	36721 0	36821 0	36721 2	36921 1	37021 2	37121 2	37121 3
	1	2	3	4	5	6	7	8
	Dyke	N Turf	Dyke	Sphag	Sphag	Dyke	Fen	Dyke
Species	Sleuce	Pond	Mill M	Sleuce	Mill M	Bridge	Hubbs	Hubbs
Agabus bipustulatus		X	X	X	X		X	
Agabus sturmii					X			
Agabus unguicularis						X		
Anacaena globulus							X	
Anacaena limbata	X	X	X	X			X	
Anacaena lutescens		X						
Cercyon convexiusculus		X						
Coelostoma orbiculare			X	X				
Colymbetes fuscus							X	
Liopterus haemorrhoidalis		X	X				X	
Cymbiodyta marginellus							X	
Dryops anglicanus	X	X	X	X			X	X
Dytiscus semisulcatus			X					
Enochrus coarctatus		X	X	X	X	X	X	X
Enochrus ochropterus					X			
Enochrus testaceus			X	X		X		
Graphoderus cinereus			X			X		X
Graptodytes granularis		X		X	X		X	X
Gyrinus marinus	X							X
Gyrinus suffriani	X	X	X					
Haliplus ruficollis			X			X		X
Helochares obscurus		X			X	X	X	X
Hydaticus seminiger	X					X	X	X
Hydaticus transversalis			X			X		X
Hydraena palustris	X							
Hydraena riparia		X	X				X	X
Hydraena testacea						X	X	
Hydrobius fuscipes		X	X			X	X	
Hydrochus brevis		X				X		
Hydrochus ignicollis						X		X
Hydrochus megaphallus					X			
Hydroporus angustatus	X		X	X			X	
Hydroporus erythrocephalus	X		X	X				
Hydroporus gyllenhalii	X							
Hydroporus neglectus					X			
Hydroporus palustris			X	X				
Hydroporus scalesianus					X		X	

Hydroporus tristis		X		X	X		X	
Hygrobia hermanni	X							
Hygrotus decoratus		X		X	X		X	
Hygrotus inaequalis			X	X				
Hyphydrus ovatus	X	X	X	X		X		X
Ilybius guttiger		X					X	
Ilybius quadriguttatus						X		X
Laccobius bipunctatus				X				
Laccobius colon	X							
Laccobius minutus			X					
Laccophilus minutus	X							
Limnebius aluta	X	X	X	X	X	X	X	
Noterus clavicornis		X	X	X				X
Grid ref: TG	**366211**	**367210**	**368210**	**367212**	**369211**	**370212**	**371212**	**371213**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Dyke	**N Turf**	**Dyke**	**Sphag**	**Sphag**	**Dyke**	**Fen**	**Dyke**
Species	**Sleuce**	**Pond**	**Mill M**	**Sleuce**	**Mill M**	**Bridge**	**Hubbs**	**Hubbs**
Noterus crassicornis						X		
Ochthebius minimus			X		X			
Peltodytes caesus			X					
Rhantus grapii			X		X	X	X	X
Rhantus suturalis				X				
Suphrodytes dorsalis					X		X	
No of species / site:	**14**	**19**	**25**	**18**	**15**	**16**	**22**	**15**
Total No of species recorded: 56								

Appendix 2:
Taxonomic list of Aquatic coleoptera recorded in survey showing National status categories taken from Foster 2010

Species	Status using present IUCN categories (and criteria).	Status in Ball (1986) and Shirt (1987) [Hyman & Parsons (1992, 1994) if different }.
HALIPLIDAE		
Haliplus ruficollis		
PELTODYTES		
Peltodytes caesus	**Nationally Scarce**	**Nb**
NOTERIDAE		
Noterus clavicornis		
Noterus crassicornis	**Nationally Scarce**	**Nb**
PAELOBIIDAE		
Hygrobia hermani		
DYTISCIDAE		
Laccophilus minutus		
Colymbetes fuscus		
Hyphydrus ovatus		
Hygrotus decoratus		(Nb)
Hygrotus inaequalis		
Hydroporus angustatus		
Suphrodytes dorsalis		
Hydroporus erythrocephalus		
Hydroporus gyllenhali		
Hydroporus neglectus	**Nationally Scarce**	**Nb**
Hydroporus palustris		
Hydroporus scalesianus	**Vulnerable**	**RDB 2**
Hydroporus tristis		
Graptodytes granularis		(Nb)
Copelatus haemorrhoidalis		
Agabus bipustulatus		
Agabus sturmi		
Agabus unguicularis		(Nb)
Ilybius guttiger		(Nb)
Ilybius quadriguttatus		
Rhantus grapii		(Nb)
Rhantus suturalis		(Nb)
Dytiscus semisulcatus		
Hydaticus seminiger		**Nb**
Hydaticus transversalis		**Nb** (RDB3)
Graphoderus cinereus	**Vulnerable**	**RDB 2**
GYRINIDAE		
Gyrinus marinus		
Gyrinus suffriani	**Vulnerable**	**RDB 2**
HYDROCHIDAE		
Hydrochus brevis	**Near Threatened**	**RDB 3**

Hydrochus ignicollis	**Near Threatened**	**RDB 3**
Hydrochus megaphallus	**Vulnerable**	**RDB 2**
HYDROPHILIDAE		
Coelostoma orbiculare		
Cercyon convexiusculus		(Nb)
Hydrobius fuscipes		
Anacaena globulus		
Anacaena limbata		
Anacaena lutescens		
Laccobius bipunctatus		
Laccobius colon		
Laccobius minutus		
Helochares obscurus	**Vulnerable**	**RDB 2**
Enochrus coarctatus		
Enochrus ochropterus		(Nb)
Enochrus testaceus		
Cymbiodyta marginellus		
HYDRAENIDAE		
Hydraena palustris	**Near Threatened**	**RDB 3**
Hydraena riparia		
Hydraena testacea		(Nb)
Limnebius aluta	**Near Threatened**	**RDB 3**
Ochthebius minutus		
DRYOPIDAE		
Dryops anglicanus	**Near Threatened**	**RDB 3**

Note. Figures in brackets show 2004 status

Appendix 3:
Other fauna recorded in survey

Site	Common name	Status
No 1. Dyke. [redacted]		
Water bugs		
Gerris argentatus	A pond skater	
Notonecta glauca	A backswimmer	
Hesperocorixa linnaei	A lesser water-boatman	
Nepa cinerea	Water scorpion	
Ilycoris cimicoides	Saucer bug	
Microvelia reticulata	Minute water-cricket	
	Minnow	
	Nine-spined stickleback	
	Dragonfly nymphs	
	Damselfly nymphs	
	Caddis larvae	
	Water spider	
	Water snails	
No 2. The [redacted]		
Water bugs		
Notonecta glauca	A backswimmer	
Cymatia coleoptrata	A lesser water-boatman	
Nepa cinerea	Water scorpion	
Ilycoris cimicoides	Saucer bug	
Microvelia reticulata	Minute water-cricket	
	Nine-spined stickleback	
	Smooth newt larvae	
	Water spider	
No 3. Dyke. [redacted]		
Water bugs		
Notonecta glauca	A backswimmer	
Gerris argentatus	A pond skater	
Hesperocorixa linnaei	A lesser water-boatman	
Hesperocorixa sahlbergi	A lesser water-boatman	
Nepa cinerea	Water scorpion	
Ilycoris cimicoides	Saucer bug	
	Dragonfly nymphs	
	Damselfly nymphs	
	Water spider	
	Nine-spined stickleback	
	Water spider	
	Smooth newt larvae	
	Water snails (abuntant)	
No 4. *Sphagnum* & dyke [redacted]		

Water bugs		
Notonecta glauca	A backswimmer	
Hesperocorixa linnaei	A lesser water-boatman	
Nepa cinerea	Water scorpion	
Ilycoris cimicoides	Saucer bug	
	Nine-spined stickleback	
No 5. *Sphagnum*. [redacted]		
Water bugs		
Nepa cinerea	Water scorpion	
	Nine-spined stickleback	
No 6. Dyke at bridge		
Water bugs		
Notonecta glauca	A backswimmer	
Hesperocorixa linnaei	A lesser water-boatman	
Ilycoris cimicoides	Saucer bug	
	Water spider	
	Dragonfly nymphs	
	Damselfly nymphs	
No 7. Fen. [redacted]		
	Nine-spined stickleback	
No 8.Dyke. [redacted]		
Water bugs		
Gerris odontogaster	A pond skater	
Notonecta glauca	A backswimmer	
Hesperocorixa linnaei	A lesser water-boatman	
Hydrometra gracilenta	Lesser water-measurer	RDB 3. BAP
Nepa cinerea	Water scorpion	
Hesperocorixa linnaei	A lesser water-boatman	

Appendix 4:
Photographs of the sites surveyed

Photographs of the sites surveyed. September 17th 2014

Site No 1. Dyke. Sluice Marsh

Drying out fen adjacent to site No 1

Site No 2. The New Turf Pond

Site No 2. close up survey site

Site No3. Dyke, Mill Marsh

Site No 3 close up shallow margins

Plate 1

Photographs of the sites surveyed. 17/18 September 2014

Site No 4. Dyke Sluice Marsh

Site No 4 shallow margins, sphagnum

Site No 5. Sphagnum bog Mill Marsh

Site No 5. Pools in sphagnum

Site No 6. Dyke at bridge

Site No 6. Dyke & bridge

Plate 2

Photographs of the sites surveyed. 18th September 2014

Site No 7. Fen, Hubbard's Marsh

Site No 7. One of the pools surveyed

Site No 8. Dyke Hubbard's Marsh

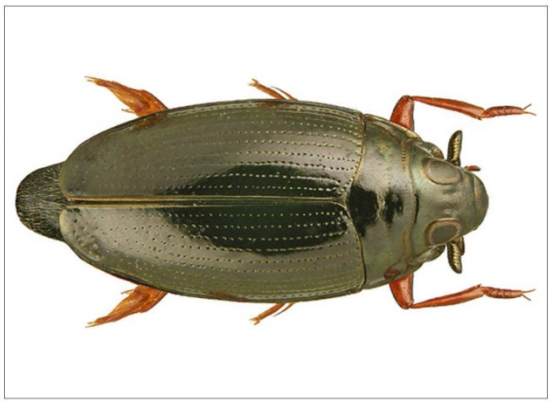
Site No 8. Edge of dyke

Plate 3

Appendix 5:

Photographs of the rare water beetles recorded on SSSI Unit 3

Photographs of the rare water beetles recorded



Gyrinus suffriani

Hydroporus scalesianus

Graphoderus cinereus

Hydrochus brevis

Hydrochus ignicollis

Hydrochus megaphallus

Plate 4

Photographs of some of the rare species recorded

Helophorus obscurus

Hydraena palustris

Limnebius aluta

Dryops anglicanus

Hydaticus transversalis

Hydrometra gracilenta

Plate 5